REMARKS/ARGUMENTS

Claims 11, 13, 16, 19 and 23 are amended. Claims 24-26 are new. Claims 11, 13, 16, 19 and 23 were amended to put them in better condition for further prosecution. No new matter has been added.

Remarks regarding 35 USC 112

Claims 11-15 stand rejected for allegedly failing to satisfy the enablement prong of 35 USC 112. The Examiner asserts that the recitation in claim 11 stating "constant flow rate" challenges "at least one of the laws of thermodynamics - conservation of energy, for flow through an empty conduit would have a pressure drop associated with it due to friction loss" and accordingly, fail to teach one of ordinary skill in the art how to maintain a constant flow rate (*See*, 17 May 2006 Office Action, page 2). Applicants respectfully disagree.

Applicants respectfully assert that it is common practice in the beverage industry and well known to the one skilled in the art that filtration is performed by at least the following steps:

a) a filter aid is added to the turbid beverage, usually by continuous dosage;

b) the turbid beverage with the filter aid is the allowed to pass an auxiliary filter. The filter aid and the haze causing particles ("haze") of the beverage, e.g. yeast cells, settle on the auxiliary filter and form a filter cake.

c) past the filter yields a clear beverage.

In step b), settling of filter aid and haze on already formed filter cake is a continuous process. Thus, during the filtration, the filter cake is continuously growing in thickness. The thicker the filter cake the higher a resistance to the flow is generated.

Further, Applicants respectfully assert that changes in the flow rate, especially when appearing suddenly, are unwanted as this could lead to a breakage of the filter cake and consequently immediate filtration stoppage. Therefore, the pressure in front of the filter is increased continuously so far that the resistance of the filter cake is compensated for as it grows and the flow rate is kept constant.

This procedure is summarized in, for example, pages 334 to 337 of *Filtration - principles*

and practices (Chemical industries; v. 27), M. J. Matteson, C. Orr (eds.), 2nd edition, Marcel Dekker, New York, 1987 (attached hereto). Moreover, methods performing the aforementioned filtration method employing a constant rate are everyday practice in the beverage industry and thus, the one skilled in the art knows how to adjust the pressure to keep the flow rate constant.

Accordingly, claims 11-15 are enabled and Applicants therefore request withdrawal of the 112 rejection.

Remarks regarding 35 USC 102 and 103

Claims 15-23 stand rejected under 35 U.S.C. §102(b) as allegedly being anticipated by, and in the alternative under 35 U.S.C. §103(a) as allegedly being rendered obvious by, the disclosure of Van Den Eynde et al. (US 6,117,459).

First, because claim 15 depends from claim 11, and claim 11 stands free of prior art, claim 15 must also stand free of prior art. Accordingly, the 102 and 103 rejections of claim 15 are moot.

Van Den Eynde et al. relates to a regenerable filtration adjuvant which comprises synthetic or natural incompressible grains of polymers or grains having a certain sphericity coefficient below 1. According to the disclosure of Van Den Eynde et al., the incompressibility and the shape of the grains ensure the formation of a filter cake which exhibits adequate porosity without having an excessive distribution of the pore sizes. Exemplarily, Van Den Eynde et al. disclose that the grains may be made from polyamide, polyvinylchloride, fluorinated products such as Teflon®, polypropylene, polystyrene, polyethylene, certain derivatives of silica such as ryolites or glass, and mixtures thereof, and demonstrates the efficiency of the filtration adjuvant using grains made from nylon 11.

Additionally, Van Den Eynde et al. discloses conducting a stabilization step during or after the filtration procedure, using conventional filtration adjuvants such as silica gels, gallic tannins and PVPP. The concomitant filtration and stabilization is achieved in accordance with the examples provided by Van Den Eynde et al. by using a (physical) mixture of the aforementioned nylon 11 Rilsan® and PVPP.

Claim 16-23 differ from the teaching of Van Den Eynde et al. in that a compounded polymer composition comprising certain amounts of thermoplastic polymers (e.g., polyolefins and polyamides), and further added substances, rather than a physical mixture of separate polymers is employed as a filter aid or stabilizer for filtering and/or stabilizing an aqueous liquid. As described in the specification, compounding provides for a mixture of the polymers which is no longer in individual and separable form, and which exhibits a property profile which is different from the property profile of a physical mixture of the polymers.

Anticipation can only be established by a single prior art reference which discloses each and every element of the claimed invention (*See*, *RCA Corp. v. Applied Digital Data Systems, Inc.*, 730 F.2d 1440, 1444 (Fed. Cir. 1984)). "The identical invention must be shown in as complete detail as is contained in the patent claim" (*Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236 (Fed. Cir. 1989)). It is not enough, however, that the reference discloses all the claimed elements in isolation. Rather, as stated by the Federal Circuit, the cited art reference must disclose each element of the claimed invention “arranged as in the claim” (*Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 1548 (Fed. Cir. 1983)).

When those criteria are applied to the disclosure of Van Den Eynde et al., it fails to anticipate Applicants’ invention within the meaning of §102. Van Den Eynde et al. merely address physical mixtures of the stabilizing agents and the filtration aids and not, as required in accordance with Applicants’ invention, mixtures which are obtained by compounding polyolefins and polyamides, and further added substances. Accordingly, Van Den Eynde et al. therefore fails to identically describe Applicants’ invention “arranged as in the claim” of Applicants’ invention. It is therefore respectfully requested that the rejection of Applicants’ Claims 15-23 under Section 102(b) based on the teaching of Van Den Eynde et al. be withdrawn.

It is further respectfully urged that the teaching of Van Den Eynde et al. cannot reasonably be taken to render Applicants’ invention *prima facie* obvious within the meaning of Section 103(a). To establish *prima facie* obviousness, the Examiner must show in the prior art some suggestion or motivation to make the claimed invention, a reasonable expectation for success in doing so, and a teaching or suggestion of each claim element (*See, e.g., In re Fine*,

837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*, 958 F.2d 347, 21 USPQ 2d 1941 (Fed. Cir. 1992); *In re Merck & Co., Inc.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986); *In re Royka,* 490 F.2d 981, 180 USPQ 580 (CCPA 1974)). However, mere identification in the prior art of each element is insufficient to defeat the patentability of the combined subject matter as a whole (*In re Rouffet*, 149 F.3d 1350, 1355, 1357 (Fed. Cir. 1998)). Rather, to establish a *prima facie* case of obviousness based on a combination of elements disclosed in the prior art, the Examiner must articulate the basis on which it concludes that it would have been obvious to make the claimed invention (*Id.*). In practice, this requires that the Examiner "explain the reasons one of ordinary skill in the art would have been motivated to select the references and to combine them to render the claimed invention obvious" (*Id.* at 1357-59). This entails consideration of both the "scope and content of the prior art" and "level of ordinary skill in the pertinent art" aspects of the *Graham* test.

To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art (*See*, *In re Royka*).

Applicants respectfully assert Van Den Eynde et al. fails to teach, suggest or disclose all the limitations of the instant claimed invention. Van Den Eynde et al. art fails to teach, suggest or disclose at least the following:

The cited art reference fails at least to teach, suggest or disclose a polymer which comprises

a) from 20 to 95% by weight of at least one thermoplastic polymer from the group consisting of polyolefins and polyamides,

b) 80 to 5% by weight of at least one further substance selected from the group consisting of silicates, carbonates, oxides, silica gel, kieselguhr, diatomaceous earth, crosslinked polyvinyllactams and mixtures thereof, the polymer powders being obtained by compounding the thermoplastic polymers (a) and the further substances (b) in an extruder.

as required in accordance with Applicants' claim 16. Accordingly, Applicants respectfully request withdrawal of the 103 rejection and allowance of claim 16-23

Further, the Board of Patent Appeals and Interference in *Ex parte Obukowicz*, (27 USPQ 2d 1063, 1065 (1992)), indicated that a statement that provides general guidance, and is not at all specific to the claimed invention and how to achieve it, does not make the invention obvious. General disclosure regarding regenerable filtration adjuvants is not specific to a compounded thermoplastic polymer. Accordingly, *prima facie* obviousness has not been established and Applicants respectfully request withdrawal of the 103 rejection.

Double patenting

The Examiner rejected Applicants' claims under the judicially created doctrine of obviousness-type double patenting as being unpatentable in light of the combination of Van Den Eynde and co-pending Application 10/398,179

Applicants herewith submit a terminal disclaimer disclaiming the terminal part of a patent granted on this application which would extend beyond the expiration date of co-pending Application 10/398,179, and agreeing that a patent granted on this application shall be enforceable only for and during such period that the legal title of such patent is the same as the legal title to co-pending Application 10/398,179. Withdrawal of the rejection under the judicially created doctrine of obviousness-type double patenting is therefore respectfully solicited.

Conclusion

Applicants respectfully submit that the present application is in condition for allowance, which action is courteously requested. Please charge the one-month extension fee to the credit card listed on the enclosed Form PTO-2038. Please charge any shortage in fees due in connection with the filing of this paper to Deposit Account 14.1437. Please credit any excess fees to such account.

Respectfully submitted,

Todd R. Samelman
Registration No.: 53,547

NOVAK DRUCE & QUIGG, LLP
Customer No.: 26474
1300 Eye St. N.W.
400 East Tower
Washington, D.C. 20005
Phone: (202) 659-0100
Fax: (202) 659-0105

$$-\mu u \rho_s \, d\omega = \frac{dp_s}{\alpha} \tag{16}$$

Integration of Eq. (16) is carried out between the limits (see Fig. 17) of $\omega = 0$ at the medium and $\omega = \omega_0$ at the cake surface and of $p_s = p - p_m$ at the medium and $p_s = 0$ at the cake surface. The pressure p_m at the exit of the filtrate from the cake is related to the medium resistance R_m by

$$p_m = \mu u_1 R_m \tag{17}$$

where u_1 is the filtration rate. Integrating Eq. (16) on the assumption that u is constant (= u_1) throughout the bed and substituting limits leads to

$$\mu u_1 \rho_s \omega_0 = \mu u_1 w = \int_0^{p-p_m} \frac{dp_s}{\alpha} \tag{18}$$

The average filtration resistance α_{av} is defined by

$$\frac{1}{\alpha_{av}} = \frac{1}{p - p_m} \int_0^{p-p_m} \frac{dp_s}{\alpha} \tag{19}$$

Substituting for the integral in Eq. (18) and eliminating p_m by use of Eq. (17) produces

$$\mu u_1 w = \frac{p - \mu u_1 R_m}{\alpha_{av}} \tag{20}$$

Solving for u_1 gives

$$\frac{dv}{d\theta} = u_1 = \frac{p}{\mu(\alpha_{av} w + R_m)} \tag{21}$$

where v is the filtrate volume per unit area and θ is the filtration time. Many analyses of filtration start with Eq. (21). The derivation is not rigorous in that it has been assumed that u and the area are constant throughout the bed. Shirato et al. [20] investigated cakes in which a more complex equation resulted because of the variation of u with distance. Equation (19) is only approximately correct and the average filtration resistance must be modified for a general expression, especially for thick slurries, as

$$\alpha_{av}' = J_s \alpha_{av} \tag{22}$$

where α_{av}' is the average filtration resistance which accounts for the internal flow variations in filter cake and J_s is the correction factor for α_{av}. The factor J_s depends on filtration pressure and slurry concentration. While the pressure has relatively little effect, the value of J_s may

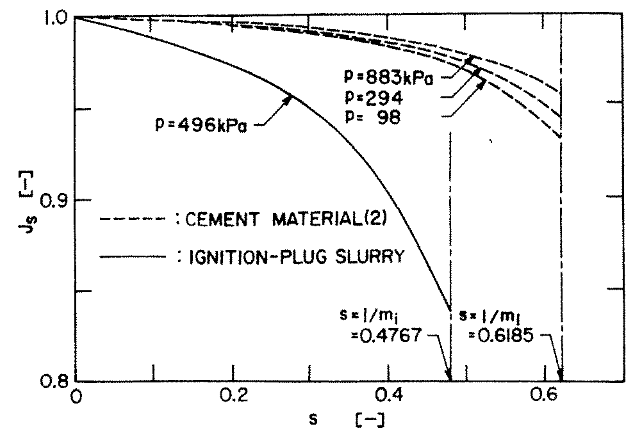

FIG. 19 Correction factor J_s vs s.

change markedly for concentrated slurries of moderately compressible materials, as illustrated in Fig. 19. Whenever area varies, as in radial flow, Eq. (21) must be modified.

Basically Eq. (21) states that

$$\text{Rate} = \frac{\text{pressure drop}}{\mu(\text{cake resistance} + \text{medium resistance})} \tag{23}$$

The total cake resistance changes as the mass of cake w grows with time. While it is assumed that R_m is constant, it probably changes for some media during filtration because of the migration of fine particles with subsequent deposition in the media. Unless the medium can be cleaned perfectly between runs, the resistance will gradually increase until finally the medium must be discarded or reworked.

D. Pumping Mechanisms

For purposes of mathematical treatment, filtration processes are classified according to the variation of the pressure and flow rate with time. Generally, the pumping mechanism determines the flow characteristics and serves as a basis for division into the following categories: (a) constant-pressure filtration (the actuating mechanism is compressed gas maintained at a constant pressure, or a vacuum pump), (b) constant-rate filtration (positive displacement pumps of various types are employed), and (c) variable-pressure, variable-rate filtration (the use of a centrifugal pump results in the rate varying with the back-pressure on the pump).

Filtration pressure versus time characteristics for the three types of filtration are illustrated in Fig. 20. The constant-pressure curve is represented by a horizontal line. The pressure increases with time linearly for the constant-pressure filtration of incompressible cake. Variable-pressure, variable-rate filtration is conducted by using a filter actuated by a centri-

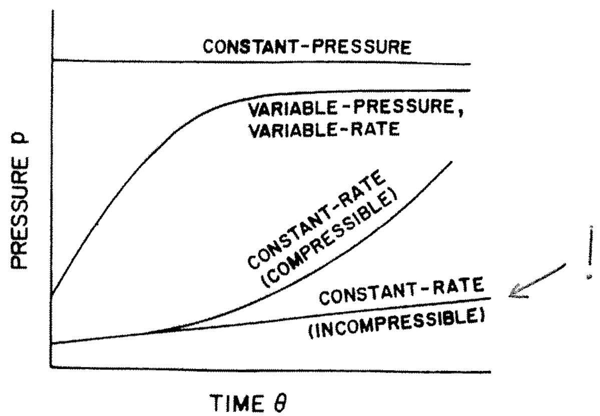

FIG. 20 Relation of filtration pressure to time for different methods of operation.

fugal pump. Depending on the characteristics of the centrifugal pump, widely differing curves may be encountered. If the first portion of the curve is nearly straight, the pump will produce a filtration that is almost at constant rate. The curve is approximately equivalent to a filtration carried out first at constant rate and then at constant pressure.

E. Material Balance

From an overall viewpoint, a material balance can be written on a unit area basis in the form:

Mass of slurry = mass of cake + mass of filtrate

$$\frac{w}{s} = mw + \rho v \tag{24}$$

where s is the average mass fraction of solids in the slurry, m the mass of wet cake per unit mass of dry cake, and ρ the density of the filtrate. Solving for v in Eq. (24) yields

$$v = \frac{1 - ms}{\rho s} w \tag{25}$$

Differentiating v with respect to time yields the flow rate u_1 of filtrate

$$u_1 = \frac{dv}{d\theta} = \frac{1 - ms}{\rho s}\frac{dw}{d\theta} - \frac{w}{\rho}\frac{dm}{d\theta} \tag{26}$$

For the most part, m is considered constant, and $dm/d\theta$ is set equal to zero. In general, m varies in any filtration in which the pressure continuously rises. In constant-pressure filtration of talc, latex, and calcium carbonate, it was shown by Tiller and Cooper [30] that m reached a con-

stant value in less than 0.5 min. For long batch filtrations, a variation over such a short period of time would be of little significance and could be neglected. However, in rotary drum filtration where the filtration time for a 120° submergence at 0.5 rpm is 40 sec, it is not possible to assume m constant. In general, sophisticated numerical methods would be required for continuous rotary filtration if accurate calculations were needed.

The mass of wet cake per unit mass of dry cake m frequently must be related to the average porosity ε_{av} of the cake. A simple calculation of m yields

$$m = 1 + \frac{\rho \varepsilon_{av}}{\rho_s(1 - \varepsilon_{av})} \tag{27}$$

It is important to relate the cake thickness to both w and v. For the entire cake, Eq. (3) in combination with Eq. (25) yields

$$w = \frac{\rho s}{1 - ms} v = \rho_s(1 - \varepsilon_{av})L \tag{28}$$

Solving for v:

$$v = \sigma\left(\frac{1 - ms}{s}\right)(1 - \varepsilon_{av})L \tag{29}$$

where $\sigma = \rho_s/\rho$. Either m or ε_{av} can be eliminated from Eq. (29). Eliminating m yields

$$v = \sigma\left\{\left(\frac{1 - s}{s}\right) - \varepsilon_{av}\left[\sigma\left(\frac{1 - s}{s}\right) + 1\right]\right\} L \tag{30}$$

or eliminating ε_{av} gives

$$v = \frac{\sigma(1 - ms)}{s[\sigma(m - 1) + 1]} L \tag{31}$$

As most filters are designed on the basis of cake thickness, Eqs. (30) and (31) are important in converting v to L in formulas relating v to p and θ.

X. BATCH CAKE FILTRATION

Equations (18), (21), and (28) form the basis for developing design equations for cake filtration. In Eq. (21) the variables include the following: filtrate flow rate/area, $u_1 = dv/d\theta$; pressure, p; mass of dry solids/area, w; and cake resistance, α_{av}. Pressure and rate are related by pump characteristics. The mass of solids w is usually eliminated in favor of v by means of Eq. (28).

Eliminating w from Eq. (18) produces

$$\frac{\mu \rho s v u_1}{1 - ms} = \frac{\mu \rho s v}{1 - ms}\frac{dv}{d\theta} = \int_0^{p-p_m} \frac{dp_s}{\alpha} = \frac{p - p_m}{\alpha_{av}} \tag{32}$$